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Obituary Notice

of

Professor John A. Ryder.

By E. D. COPE.

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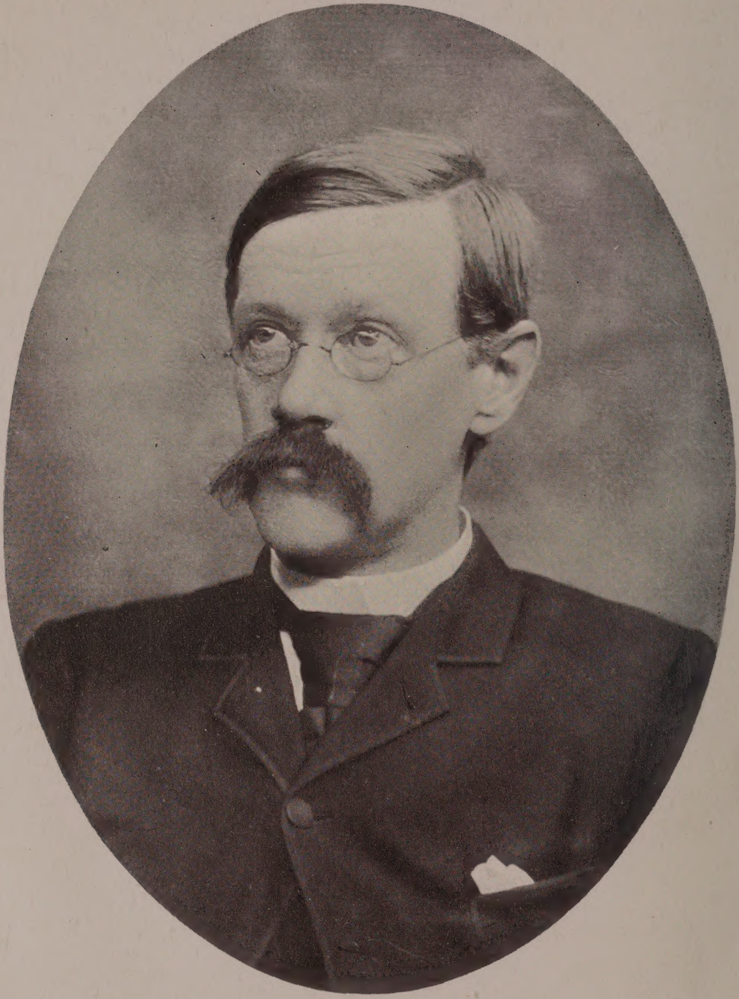

John A. Ryder

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OBITUARY NOTICE

OF

PROFESSOR JOHN A. RYDER.

By E. D. COPE.

(*Read before the American Philosophical Society, January 17, 1896.*)

John Adams Ryder, Professor of Histology and Embryology in the School of Biology of the University of Pennsylvania, was born at Loudon, in Franklin county, Pennsylvania, in 1852. His ancestry was mixed. On the paternal side his grandfather was a Puritan, descended from the Devonshire English stock which has left the local names of that country so numerously in the Barnstable region of Massachusetts. His paternal grandmother was of the German race of Lancaster county, Pennsylvania, of the name of Longnecker, which is said to be an Anglicized spelling of Langaker. On his mother's side his grandfather Fricke was a descendant of a Swiss immigrant to Pennsylvania; while his grandmother was of mixed English and Scotch ancestry, the male line coming from the Earl of Kelso, and the female from the family of Hood, the poet. This ancestry is of interest when considered in connection with Prof. Ryder's characteristics. His father possessed the traits often found in Puritans and their descendants, which have their root in an idealism which regards material conditions less than abstract principles. This family also displays what some of the Puritans do not, strong artistic ability, both in graphic and musical directions. His paternal grandmother was a highly educated woman, who encouraged intellectual life in her grandchildren by giving them rewards for essays on subjects of serious import. To her Prof. Ryder owed his excellent mastery of the German language. His character and life showed in a marked degree the energy of inherited ability, as well as the effect of early surroundings, which encouraged these natural tendencies.

As a boy Ryder delighted in natural objects, and was continually collecting, studying and drawing them. His artistic ability was one of his conspicuous traits, and stood him in good stead in his original researches and class demonstrations, in his professional career. He was not inclined to the sports incident to youth, and his student temperament drew on him the experience common to his kind, the ridicule of the thoughtless. On one occasion, while still quite young, his father proposed to present him with a watch. He asked that he receive instead a manual of mineralogy, a microscope and some chemical reagents. He was sent to the Millersville Academy, near Lancaster, Pa., but the conditions did not suit him. His desire to study natural objects was not sufficiently gratified by the necessarily mixed course of the institution, and his fellow-students, like boys generally, did not respect his preferences, and annoyed him by their inconsiderate pleasantries at his expense. He left the school without permission, and returned home, where he could pursue his studies without molestation. He was sent to another school with the same result. Ultimately he returned to Millersville, and finished the prescribed course. He, however, studied quite independently of his regular school course, teaching himself French, mathematics and stenography. He took up the differential calculus just before his death.

The Civil War greatly diminished the profits of his father's business, that of a nurseryman and fruit raiser, and the invasion of Southern Pennsylvania by the army of Lee ruined for the time being his financial prosperity. His cattle were slaughtered and his horses seized. Young Ryder was thrown on his own resources, and he naturally adopted the profession of teacher. In 1875 he came to Philadelphia to take a position in the Academy of Natural Sciences as beneficiary of a Jessup scholarship. He was now able to gratify his natural tastes. He ransacked the library, studied everything in the museum, and experimented with the technique of original research. He invented a method of mounting objects in albumen for sectioning, which he afterward abandoned for paraffine. He tested various staining methods, profiting by the suggestions of one of the pioneers in this line, Dr. J. Gibbons Hunt. Later he invented the microtome which is known by his name. His latest invention was an ingenious contrivance for capturing and sectioning the microscopic Protozoa, which opened up a field of research in which progress had been previously almost impossible. It was at this time that the writer of this notice made his acquaintance, and found in him a spirit whose devotion to the common end no discouragement could hinder or divert. And be it said with regret that even in those halls, which should be devoted to the service of just such men as Ryder, he had to feel the chill of indifference and incredulity. Some of the estimable gentlemen who like to bask in the light of science while they do nothing to feed the flame, were accustomed to tell him that he could never support himself at his chosen profession and that he should abandon it for something more profitable from a financial point of view. Among other suggestions he was advised to study medicine, and at one time he seriously considered the proposition. He consulted his present biographer as to this matter, and was advised against it. That noble profession has been the grave of not a few careers destined by nature for original research, and I feared that in Ryder we might exchange a genius in this field for a practicing physician not distinguished among many others. I pointed out to him that the universities and colleges of the country offered many opportunities, and that there was far greater need for him there than in a profession already

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overcrowded. The result fully justified my expectations, and I doubt whether any one who knew him would question the wisdom of his decision. During a period when other remunerative occupation was wanting he was employed in my paleontological laboratory, where he acquired a good knowledge of the extinct forms of vertebrate life.

His acquaintance with Prof. Spencer F. Baird, at that time director of the U. S. Commission of Fish and Fisheries, led to his appointment in 1879 as embryologist to that service. Here he had the opportunity he so much desired, and the volumes of Reports of the Commission testify to his unwearied labors. His study of the development of the tail of fishes was more thorough than the previous ones of Huxley and Agassiz. His investigation of the embryology of the shad is the only work on the subject, and his corresponding researches on the salmon and the sturgeon are of much practical utility. He was especially interested in the conditions attending the embryonic life of viviparous fishes, and he made full investigations of the early stages of species of Cyprinodontidæ and Embiotocidæ. He also published a very full report on the embryology of our edible oyster, *Ostrea virginiana*, and made some important recommendations to the commission as to methods of planting. He patented certain frames which are now used in the propagation of that important food mollusc. At this period he was editor of the Department of Embryology of the *American Naturalist*, to which many of his original observations were first made. In 1886 he was appointed to the position in the University of Pennsylvania which he held at the time of his death.

Besides his studies in embryology, Dr. Ryder made a number of interesting discoveries of new forms of life in the region about Philadelphia. Such were some fresh-water Crustacea, Thysanura, and the remarkable Myriapod genus, Eurypauropus, which has been since found in Europe. He made researches into the life history of the small fresh-water Cœlenterate *Microhydra ryderii*, which was dedicated to him by our colleague, Edward Potts, some of which remain unpublished.

It remains to speak of Dr. Ryder's contributions to the doctrine of Evolution, which were of great interest. His mechanical ability led him to perceive clearly the mechanics of natural structures and processes.

His work in this field may be divided into two periods. First, that in which he occupied himself with the molar conditions of structures and their probable causes; and second, the later one, in which he sought to measure the physical causes to which the recondite processes of growth are due. He was firmly persuaded of the insufficiency of natural selection as the sole factor at the basis of organic evolution, and opposed the first view of Weismann and the Neodarwinians that acquired characters are not inherited. He was sometimes inclined to the doctrine that structures may be in some cases wholly due to mechanical causes operative in each generation by itself.

Taking up the development of his thought on these subjects, the papers of his first period may be classified as endeavors to prove the efficacy of use and disuse in modifying structures. He first in 1877 approached the problem of the cause of the reduction of the number of digits in the Mammalia; the demonstration of the descent from four digits, and the hypothesis of the descent from five, having been already announced. He next applied the doctrine of use in explanation of the evolution of the enlarged incisor teeth of rodent mammals, in the same year. In the following year he published a more extended essay in which he showed the direct relation between the jaw movements of the ungulate Mammalia, and the forms of the molar crowns, and advanced reasons why the former had probably produced the latter. In 1889 he showed that the segmentation of the soft rays of the fins of fishes are simply fractures due to flexures, and that in the caudal fin they possess approximately the same direction as the inter-myomeric fissures. In 1892 he proposed a mechanical hypothesis of the origin of the epidermic folds and scales of the fishes, which consists of a mathematical explanation of the results of folding, due to lateral flexures of the body, to which I called attention in the case of the segmentation of the vertebral elements of the Rhachitomous Stegocephali in 1884. As an incidental result of his embryological researches, he proposed a mechanical theory of the origin of the amnion in 1886; and mechanical explanations of the different types of placentæ in 1887. He announced the very probable view that the form of the placenta is dependent on the nature of its contact with the walls of the oviduct or uterus. His latest work on this subject remains unpublished. This was a research as to the effect on embryonic growth of artificial strains to which he subjected the blastodermic tissues of the chick. He had already obtained interesting results. In the special discussion of the effects of disuse, his only paper is that on the coössification of the vertebræ of the gigantic extinct Glyptodons in relation to their unyielding carapaces.

If we now look to the attempts at a strict dynamical analysis of these phenomena, made by Dr. Ryder, we see him in a congenial field. He first in 1879, in the *American Naturalist*, published a paper on the "Ultimate Physical Unit of Living Matter," in which he considered the dynamical theories already in the field, and announced his adhesion to their intent and essence. He later elaborated his views on this subject in a paper entitled, "Energy as a Factor in Organic Evolution," in the *Proceedings* of the American Philosophical Society for 1893. Here he expounded the relations of surface tensions to growth energy in organic matter, as a cause of segmentation; as had been already considered in the case of vegetable cells by Schwendener. His special applications of these views were made in a number of papers. One of the most important of these is a "Physiological Theory of the Calcification of the Skeleton." This is a highly original essay, and he finds a mechanical hypothesis sufficient to explain all the phenomena, the basis of the process being inherited. In 1893, he published a geometrico-mechanical explanation of the form of the fowl's egg.

Dr. Ryder's views on the inheritance of acquired characters were confirmed by his studies of the deformed gold carp of the

Japanese, to which he devoted himself for a time, and the results of which he published. He also brought forward in confirmation of them the observation of Von Brunn on the inheritance of worn molars in the rat.

While he did not regard natural selection as the fundamental factor in evolution, he did not deny its efficacy in many cases. In order to show the relation of different modes of life to the struggle for existence, he made a mathematical calculation of the chances of conflict under the various conditions of exposure to which organisms are subject. He showed that the range of conditions is from a high percentage to zero.

Prof. Ryder's mind had a distinctly mechanical quality. He was not remarkable as a classifier, nor as a formulator; but as an analyzer of structures with reference to their workings, both as causes and effects, his mind was original and clear. His powers of observation were excellent, and his memory remarkable. His familiarity with the literature of the branches he cultivated was superior to that of any person with whom I have been acquainted. Like men of his type, he was free from the prepossessions of education, and he did not permit irrelevant influences to determine his judgment. He was of a most pacific disposition, but maintained his part of a controversy with vigor yet without heat. Although not members of the religious denomination of Friends, his parents were nonresistents in theological opinion, a profession which requires much moral courage in its adherents. This quality was conspicuous in Dr. Ryder, and it was well wedded to a kind of persistency which disregarded the opinions of his mental inferiors, and crowned his own labors with success. It is to pioneers of this kind that the most civilized society owes its redemption from the mass of the less civilized, who accomplish nothing more, as Goethe has said, than the feeding and clothing of themselves and the begetting of children. Such services are now better appreciated than in former years, but the beginnings of such laborers are often surrounded with difficulty, and it sometimes happens that only the garnishment of their sepulchres attracts the attention of the world to their

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existence. In Prof. Ryder's case, while he was appreciated as a teacher, he held no position in the societies in Philadelphia for the advancement of science, to which he contributed much of the best work of his life.

My own association with Prof. Ryder during the years of his residence in Philadelphia was close. Our lines of study in some directions crossed and recrossed, and I may say that in him I found a colleague single-minded and fair, with whom it was always a pleasure to work. Our differences were amicable, and our agreements were hearty. Science has suffered a most serious loss in his early removal, and his friends have lost an ideal companion.

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